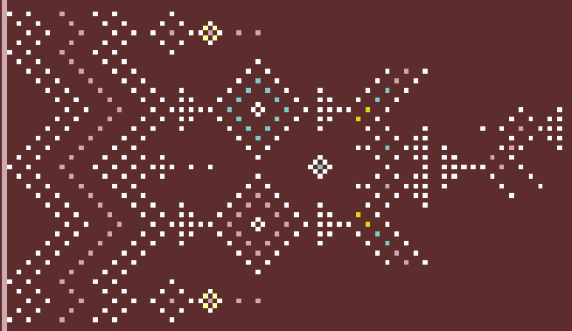
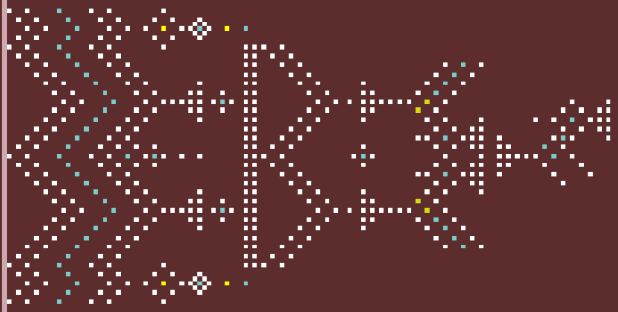
COMPUTER AIDED DESIGN FOR HANDWOVEN TEXTILES OF GUJARAT

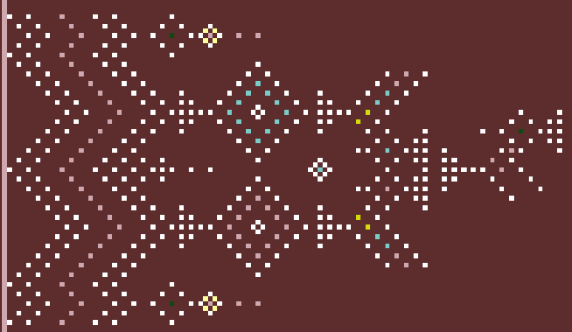
Shohrat Saiyed
Dr. Reena Bhatia

2025

All rights reserved.
Copyright © 2025







CONTENTS:

SECTION I - ABOUT CAD 4

SECTION II - DESIGNING FOR WOVEN TEXTILES

- WOVEN DESIGNING 9
- MOTIF DEVELOPMENT 11
- LAYOUT DEVELOPMENT 12

SECTION III - DESIGNING FOR TRADITIONAL WOVEN TEXTILES

- DHABLA OF KACHCHH 17
- TANGALIYA OF SURENDRANAGAR 21
- ASHAVALI SARIS OF AHMEDABAD 25

EXERCISES 30

SECTION I

ABOUT CAD

INTRODUCTION :

Computer Aided Design (CAD) in textile designs refers to the application of computer software to create, manipulate, and visualize designs for textiles. CAD allows designers to digitally design motifs and patterns. This technological tool enables precise control over colour, scale, and repeat patterns, facilitating the creation of intricate and detailed designing. It helps to visualize the design and pattern on fabrics along with colours.

There are multiple weaving softwares available but most of them are highly complicated and designed for industrial use and especially for power-looms. They are less suitable for designing handwoven textiles. The software for designing handwoven textiles was selected considering the following aspects: the software should be easy to use so that anyone who is not so familiar with the technology can also use it without assistance. In handwoven textile, where the weaving is done on a completely hand operated loom, the designing requires a lot of planning for the weaver depending on whether it is warp based design or weft based design or both. The planning starts from the very first step of warping. Hand-weaving process is complicated and time-consuming. For a handloom weaver to use a designing software, it should be simple and user friendly.

For textile design, Photoshop is largely used as design and editing software, which is also easy to use, convenient to play with the motifs and their placements, user friendly for creating layouts and exploring colour-ways. Considering these points in mind, the researcher has selected Photoshop as a digital designing tool to replace manual designing, which is time consuming.

This step-by-step instructional material is created to assist learners in designing handwoven textile patterns using Computer-Aided Design (CAD). It covers the basic tools for creating woven designs, motif development, layout creation, and generating colourways of woven textiles in CAD. The material also guides learners in developing motifs and layouts for three traditional handwoven textiles of India, specifically from the Gujarat region: Dhabla of Kachchh, Tangaliya of Surendranagar, and Ashavali saris of Ahmedabad.

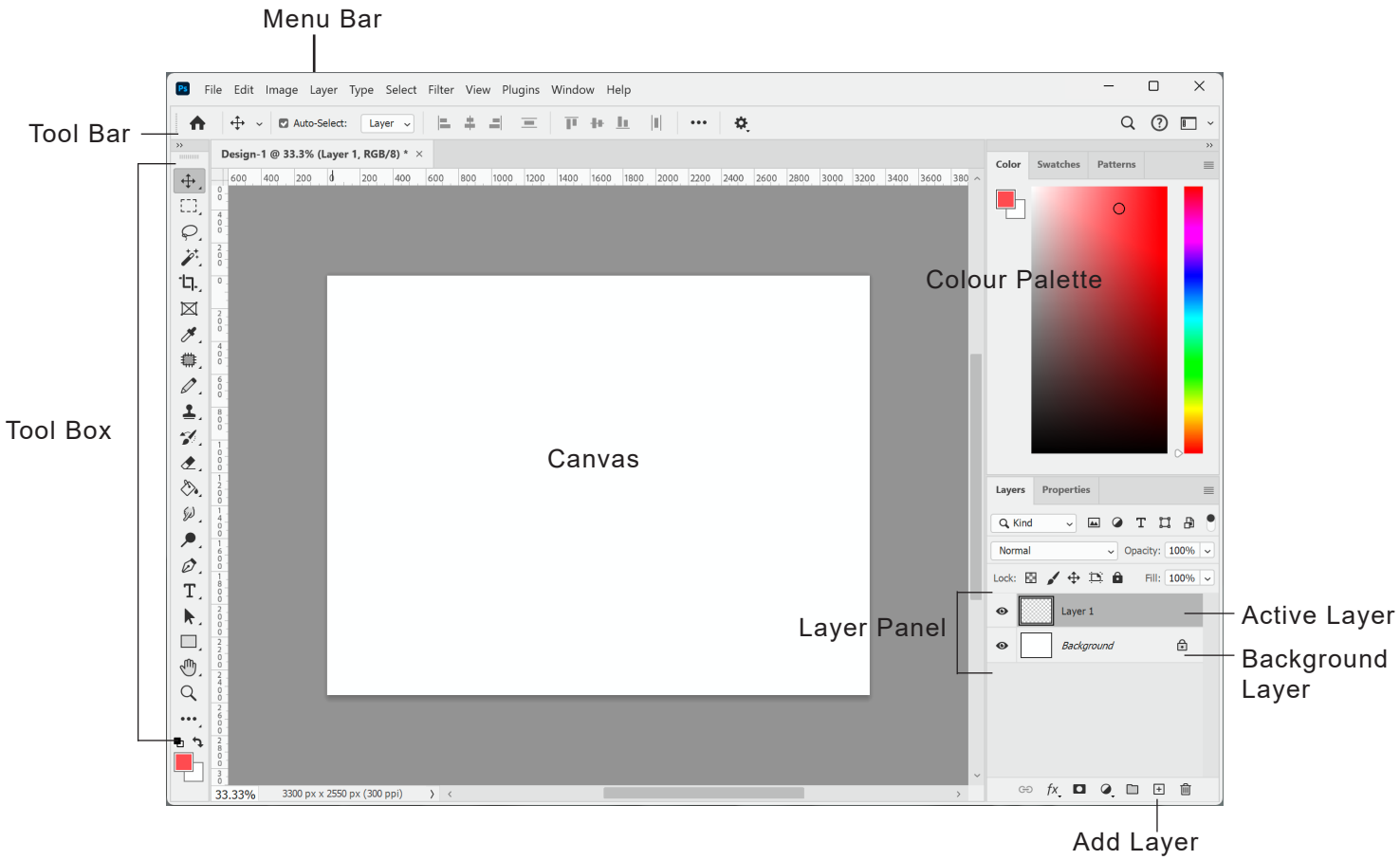
Aim : To create step-by-step instructions for designing handwoven textile using Photoshop.

Objective : To integrate CAD in Handwoven textile

Learning Outcomes : A learner will be able to create handwoven motifs, patterns, layouts and create colour-ways in CAD.

Tools Requirements : A computer system and mouse/stylus for creating designs and Photoshop as designing software.

Adobe Photoshop Interface



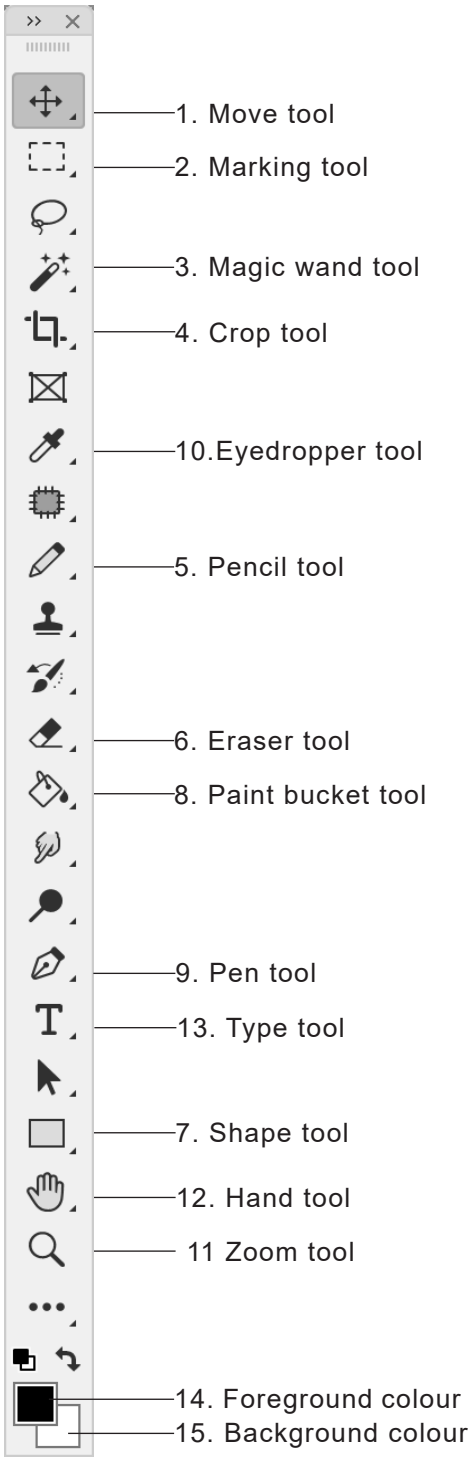
Menu Bar - Contains all the commands necessary to use the program.
Toolbox- It displays the common tools (or commands) that you need in creating /editing your designs.
Toolbar- This changes when you select a tool from the toolbox. It provides additional options for each tool, if any.
Canvas- The workspace, where you create/edit your designs.
Colour Palette - It is a tool used to select and manage colours for your designs. It helps in choosing colours, mixing custom shades, and saving frequently used colours.
Layers - Layers are one of Photoshop's most powerful features as they are individual slices of information that can be stacked or moved to create a composition of design elements. With layers, you can draw, edit, paste, and reposition elements on one layer without disturbing the others.
Active Layer - By clicking on a Layer, the darker colour in layer panel shows the active layer. The designs will be created on selected active layer only i.e. That is transparent layer.
Background Layer - The Background Layer is white i.e. the colour of background in design.

Short cuts for windows and Key-terms:

- Ctrl + T : Transform tool - to increase or decrease the size of the design.
- Ctrl + H : To make the grid visible or to hide the grid
- Ctrl + X : Cut - Cut the selected area
- Ctrl + C : Copy - Copy the selected area
- Ctrl + V : Paste - Paste the selected area
- Ctrl + Z : Undo - Revert to previous edit/design state
- Ctrl + D : Deselect the selected area/element
- Ctrl + J : To duplicate layer
- Drag : Click on the selection such as object, layer, image and hold the left button on mouse
- Drop : Releasing the mouse button to put the selection on desire area.
- You can change the colour of any specific area or design elements by selecting the area

Select area/elements, click on Paint bucket, select colour, click on the selected area/elements

Adobe Photoshop Tool Box



1. **Move tool** - this tool helps to move selections.
2. **Marking tool** - this is used for rectangular or elliptical selections.
3. **Magic wand tool** - makes a selection based on the part of the object where you click your mouse.
4. **Crop tool** - allows you to crop an image just by dragging the markers on the image border.
5. **Pencil tool** - is another of Photoshop's painting tools. But while the Brush Tool can paint soft-edge brush strokes, the Pencil tool always paints with hard edges.
6. **Eraser tool** - it permanently erases pixels on a layer.
7. **Shape tool** - It draws circle, rectangle shapes or straight lines. Use the Stroke colour and weight to control the appearance of the line.
8. **Paint bucket tool** - it fills an area of similar colour with your Foreground colour or a pattern.
9. **Pen tool -** it allows you to draw extremely precise paths, vector shapes or selections.
10. **Eyedropper tool** - use to select colour from the image.
11. **Zoom tool** - Click on the image with the Zoom tool to zoom in on a specific area. Press and hold Alt (Win) / Option (Mac) and click with the Zoom Tool to zoom out.
12. **Hand tool -** click and drag an image around on the screen to view different areas when zoomed in.
13. **Type tool** - used for adding and formatting text.
14. **Foreground colour** - the active colour used when painting, drawing, or filling
15. **Background colour -** the secondary colour, mainly used for gradient fills, erasing to the background, or filling empty areas when expanding canvas size.

SECTION II

DESIGNING FOR WOVEN TEXTILES

WOVEN DESIGNING

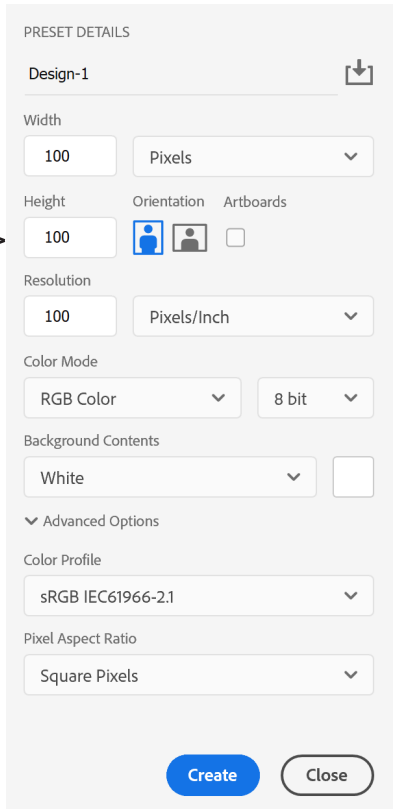
For designing woven textiles in CAD, open Photoshop on your computer. Set the preset size and resolution as per requirement of the motif/pattern and add this template to your library. An example is provided below.

STEP 1 - ADD NEW PRESET

Open new document in Photoshop. **File > New**

Custom Preset Details
Set width 50 pixels and Height 50 pixels
Enter Resolution - 50 pixel/inch

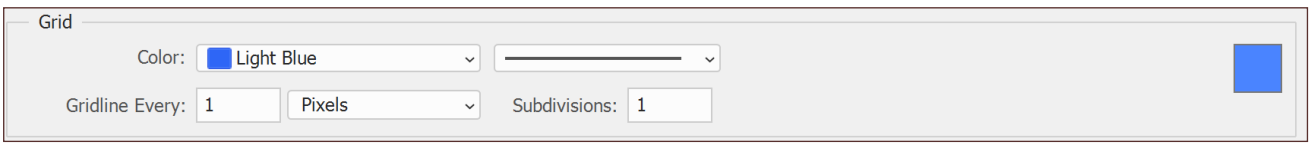
Click on **Create**



STEP 2

Click on the edit to set grid on the workspace.
Grid, here will be adjusted per pixel, to create the woven motifs easily.

Edit > Preferences > Guides, Grid & Slices
A preferences window will appear. In this window, go to **Grid** and adjust **Gridline Every**: 1 Select **Pixels** (from drop down) and **Subdivision** as 1 & Click **OK**

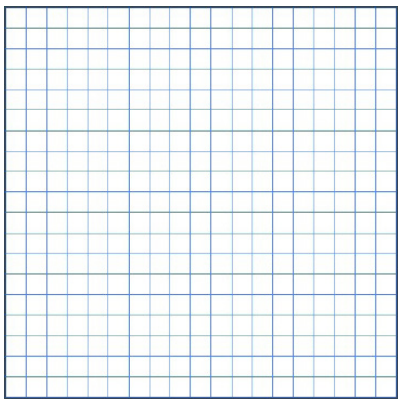


STEP 3

The grid is now adjusted but not visible yet.

Click on the view from menu bar to make the grid visible.

View > Show > Grid
OR
Press **Ctrl + H**



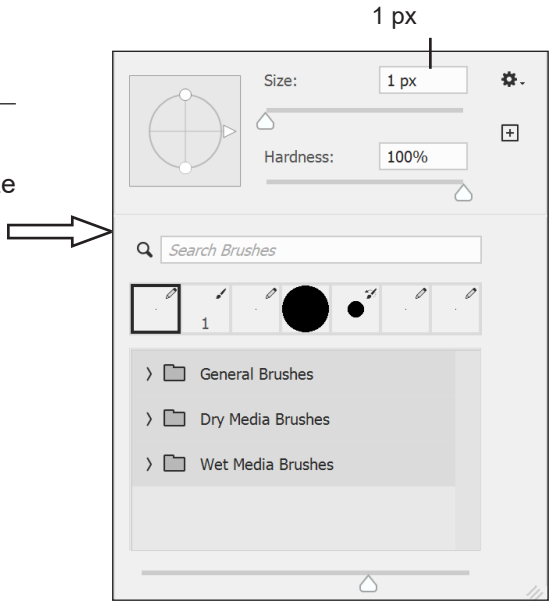
(Grid)

Click on “Zoom in” or press Crrl + to enlarge the workspace.

STEP 4 - TOOL SELECTION

Select the **Pencil tool** from the tool box.

Right-click on the canvas and adjust the Size Move the size slider to **1 pixel.**



The motifs will be created with the Pencil tool.

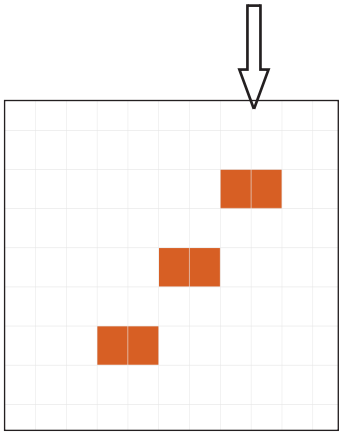
STEP 5

1. Select the colour of your choice from the colour palette.
2. Add a layer.
3. Select upper layer i.e. Layer 1 to create motifs.

Note : Refer Page No. 6

STEP 6

Start designing the motifs on the workspace by clicking on the boxes and following the grid lines.



To delete or remove pixels

For immidiate back action, Press Ctrl + Z

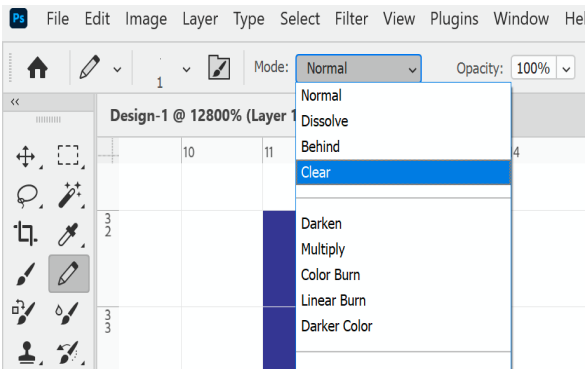
To delete the pixels, change mode from Normal to Clear. **Mode > Clear**

Click on pixels to remove the unwanted design.

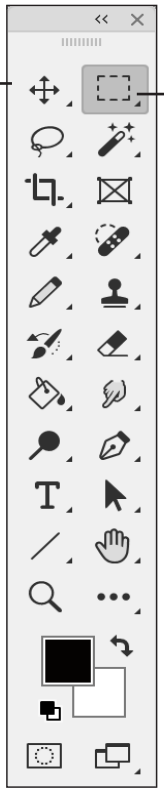
Make sure the design layer is selected when deleting the pixels.

To continue designing,

Mode > Normal



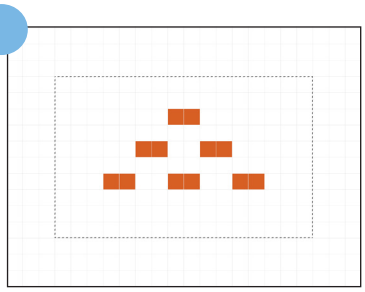
MOTIF DEVELOPMENT



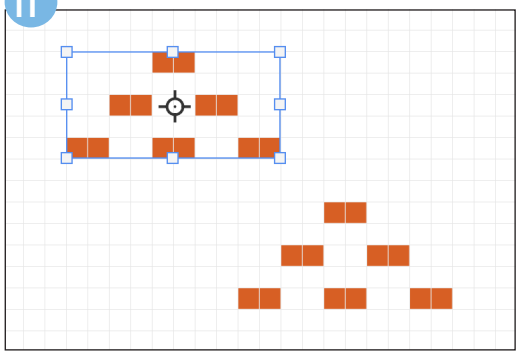
STEP 7

Click on Rectangular Marquee tool and select the one unit / motif by clicking and dragging on workspace.

I



II



STEP 8

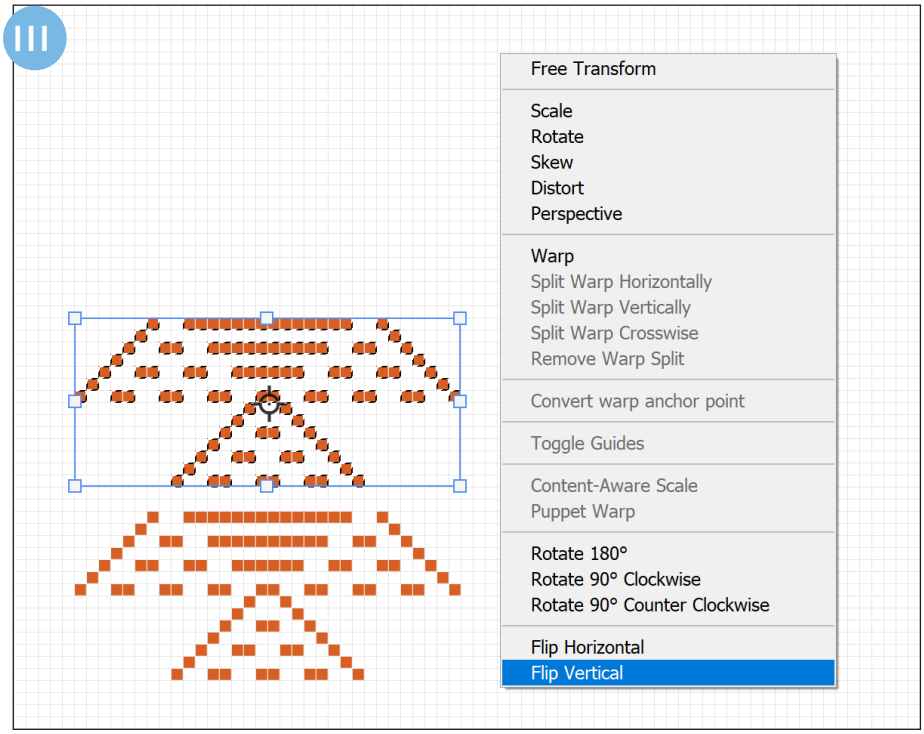
After selecting the unit/ motif,

Click on Move tool.

STEP 9

If the created unit is identical, or for duplicate the created unit/motif, hold down the Alt key and click on the selected area. When two arrows appear on the mouse pointer, drag and drop the motif, then release the Alt key OR you can simply copy and paste the selected unit/motif OR Press Ctrl + J to duplicate the layer.

III



STEP 10

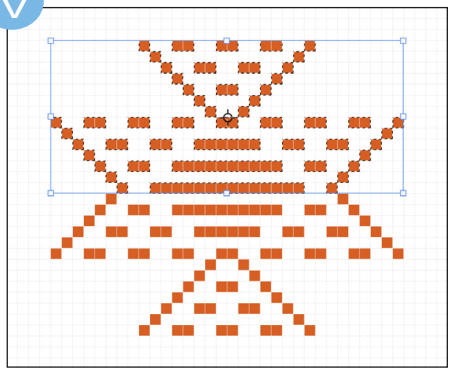
Press Crtl + T

Right Click > Flip Vertical / Horizontal / Reflect

OR

Edit > Transform > Flip Vertical / Horizontal / Reflect

IV



STEP 11

Crop and adjust motif.

To save the design / motifs

Edit > Define Pattern

Save the File

To save the document

File > Save

Add file name and click on **Save**

LAYOUT DEVELOPMENT

LAYOUT 1

STEP 1

Set preset for designing layout.

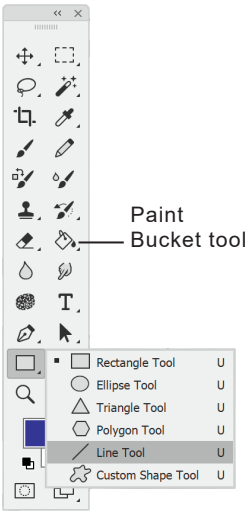
File > New
Set size as per requirement
Ex. 1000 pixels x 1000 pixels

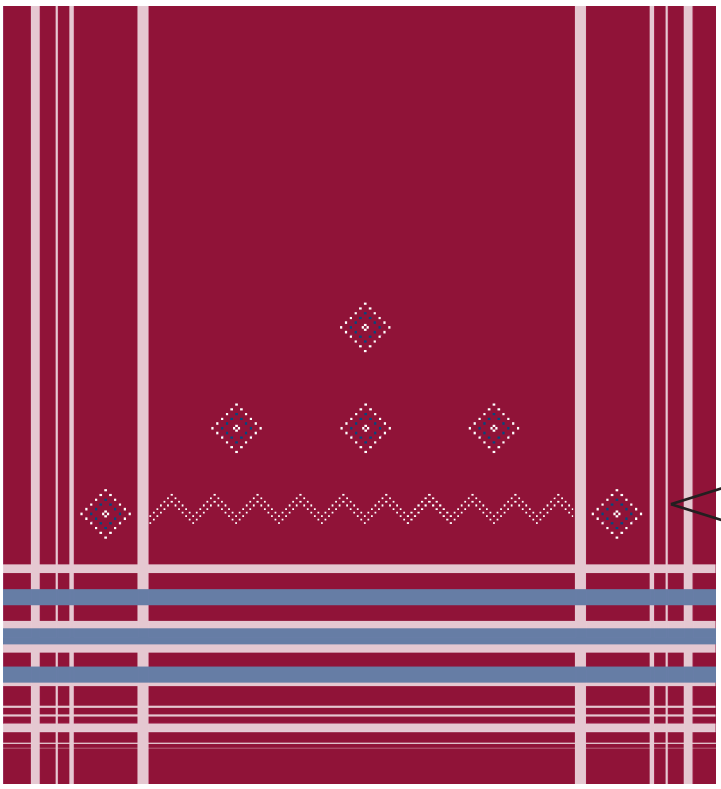
For approx. 1 meters of fabric

And click on **Create**

STEP 2

Select paint bucket tool.
Fill **background colour.**
And **add new layer**





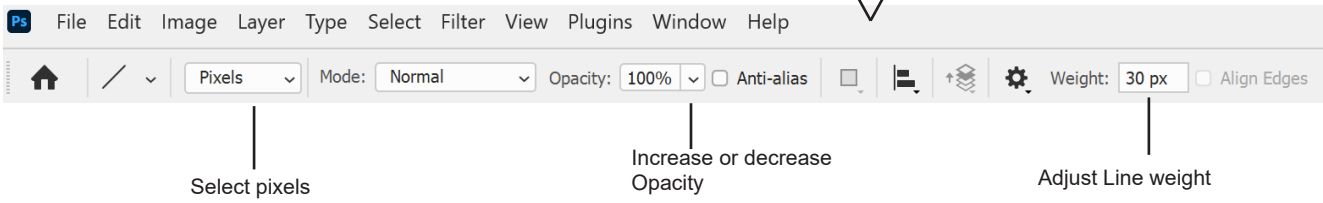
STEP 3 - MOTIF PLACEMENT

Motifs are already created and saved.
For layout development, you need to just drag and drop transparent motifs on workspace from the motif file.

1. Drag and drop motif with transparent background.
2. Adjust motifs with **move tool.**
3. To duplicate motif: Select motif from selection tool, Edit > Copy > Paste.

STEP 4

Add a new layer
Use shape tool to create Lines, Vertical and Horizontal.
Shape tool > Line tool

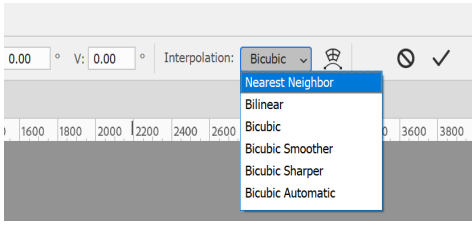


To change the Colour

Select Paint Bucket.
Select colour from colour palette.
Fill Colour by clicking on design elements.
Note: Ensure that the elements are on the active layer where you wish to apply/change colour .

* Increase or crop the size of **canvas** as per the requirement, with **crop tool.**

* When drag and drop motifs, Press Ctrl + T and select **Nearest Neighbor** option from Interpolation drop down list to avoid pixelation.



Save the File

To save the document

File > Save

Add file name

Click on **Save**

LAYOUT 2 - ALL OVER DESIGN

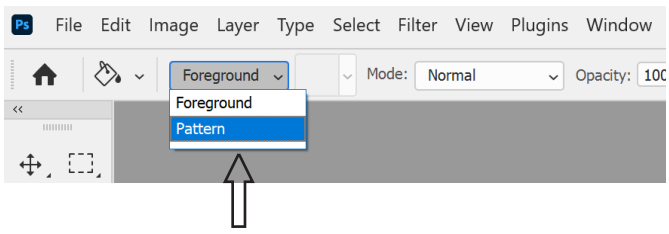
Use defined pattern where the motif is added in pattern swatches.

Create Motif

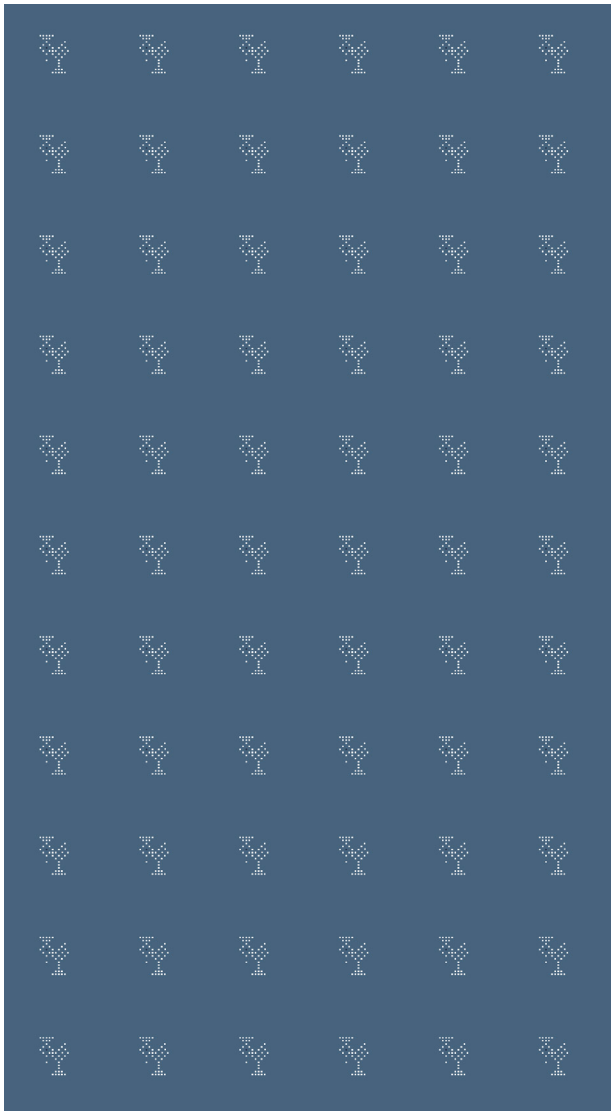
Edit > Define Pattern

- **File > New**
- Set size as per requirement
- And click on **Create**

Select Paint bucket tool



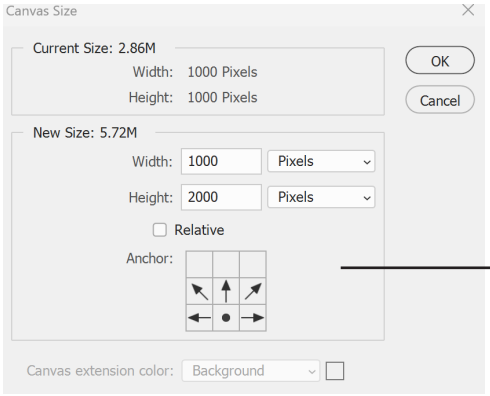
Select Pattern
Select motif from pattern swatch
Click on the work space



LAYOUT 3 HALF IDENTICAL LAYOUT

Open a new document
Preset size
Approximately,
Width : 1000 Pixels
Height : 1000 Pixels

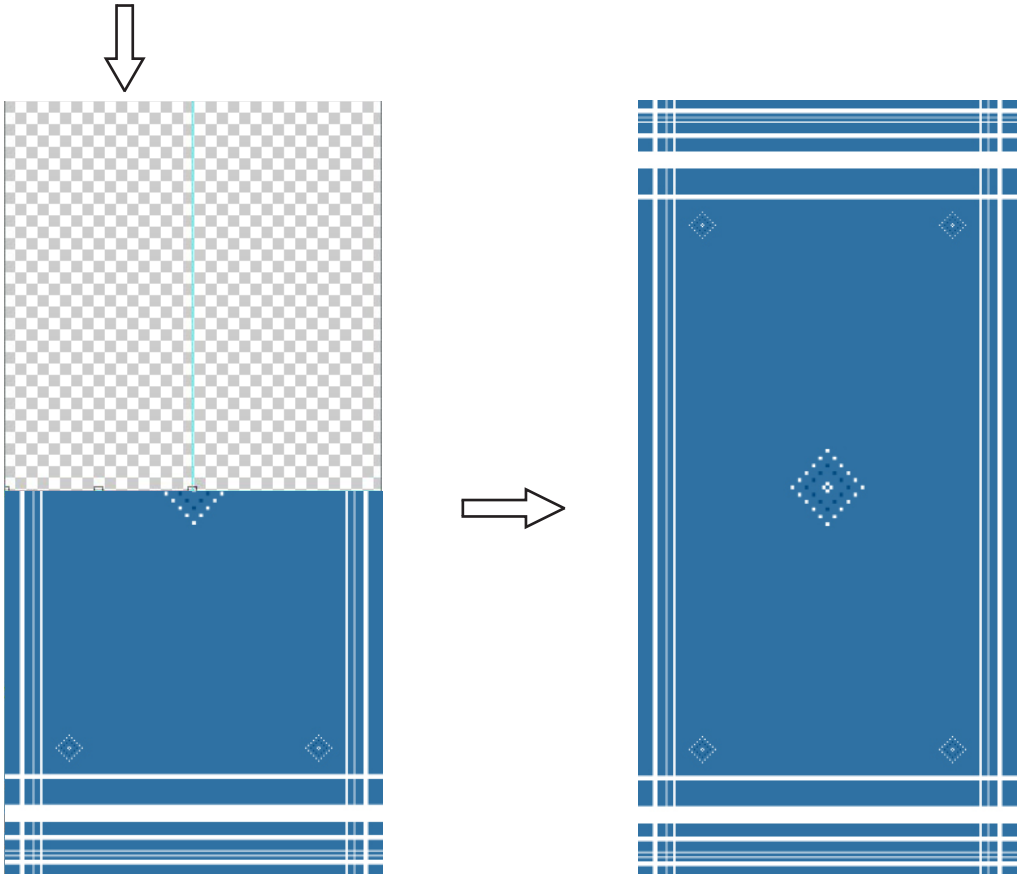
1. Fill background colour
2. Add a new Layer
3. Select colours from the colour palette and draw vertical lines to create warp patterning. Press shift and drag mouse pointer to create exact straight line. Change width from the menu bar, as per the requirement of the design.
4. Drag and drop motifs from the motif file. (Motif background should be transparent
5. Select by Rectangular Marquee Tool, Edit > Copy > Paste, create repeat pattern, change colour if requires.
6. Select all design element layer, Right click on layer panel and merge all layers.

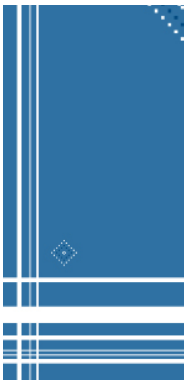


7. Click on Image menu from menu bar
Image > Canvas size
Adjust the canvas size
Width : 1000 Pixels
Height : 2000 Pixels
Anchor as shown

8. Select the whole created part on the workspace, copy & paste, transform

- Merge all layers
- Select all elements by Rectangular Marquee Tool
- Edit > Copy > Paste
- Press Crtl + T
- Right Click (mouse) > Flip Vertical / Horizontal / Reflect
- Adjust the design





For designing four sides identical layout,

Create a quarter design

Preset size, Approximately,

Width : 500 Pixels

Height : 1000 Pixels

- Create 1/4th Layout.
- Follow steps 1-8 given on Page: 14 (In Step-7, adjust anchor point in the left most corner)

To insert guidelines

Enable Rulers

Go to View > Rulers (or press Ctrl + R).

Drag Guides from Rulers

Click on the top ruler to drag a horizontal guide.

Click on the left ruler to drag a vertical guide.

Position the guides where needed.

For saving file for future editing save in Photoshop format.

File > Save, select file location, add file name, select Photoshop (*.PSD;*.PDD;*PSDT), and click on Save

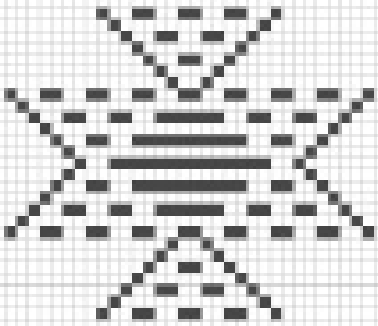
For easily send the designs in e-mail/whatsapp, you can save the file in Image format.

To save the file in image format please follow the given steps :

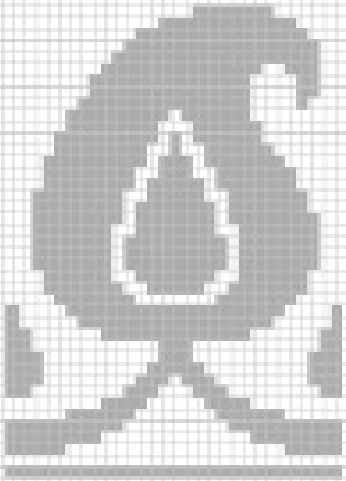
File > Save as, select file location, add file name, elect JPEG (*.JPG;*.JPEG;*.JPE) from drop down list and click on Save

To maintain the resolution of file save file in TIFF format.

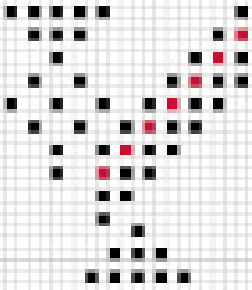
File > Save as, select file location, add file name, select TIFF (*.TIF;*.TIFF) from drop down list and click on Save



SECTION III



DESIGNING FOR TRADITIONAL WOVEN TEXTILES



DHABLA OF KACHCHH

About Craft: Dhabla is one of the oldest and renowned handloom weaving craft of Gujarat. It is a handloom crafted piece of textile woven in two halves joined from the centre with hand stitches. The term Dhablo or Dhabli refers to the Blanket, and it is worn and used by men of the Rabari community. They utilize it in various ways. They drape it around their upper body as a shawl to shield against cold or rain, sit on it during rests on their journeys, use it as a bedspread, and cover themselves while sleeping. This prestigious piece of textile accompanies them year-round, casually carried over the shoulder, even in the summer months.

Loom type - The hand operated throw shuttle pit loom

- 4 shafts loom.
- Width limited to 27 inches.

Dimension of Textile : 90 inches length and 54 inches in width

Material : Wool

Weave Structure :

- Ground weave - 2 x 14 Plain (Rib) weave for ground weave

The ground weave structure of *Dhabla* is created with interlocking technique in Plain weave. Where two sets of wefts interlocked and making the sanchi kor pattern.

- Motifs - Extra weft inserted with continuous and discontinuous techniques.

Traditional motifs

Dhungalo Motif

Kungari

PATTERN DEVELOPMENT IN CAD

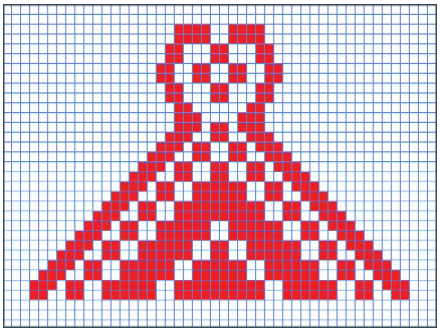
MOTIF DEVELOPMENT

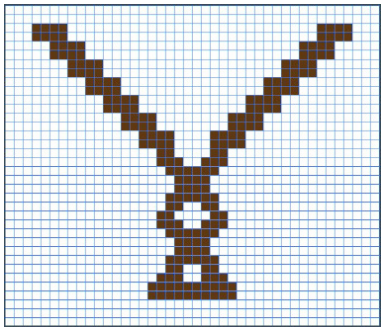
Open a new document
Preset size for
Traditional Motifs
Approximately,
Width : 50 Pixels
Height : 25 Pixels

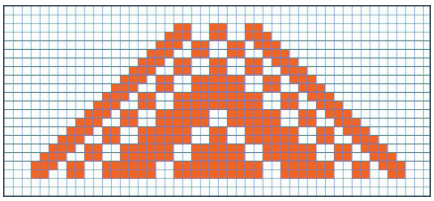
You can adjust the size of canvas the help of crop tool.

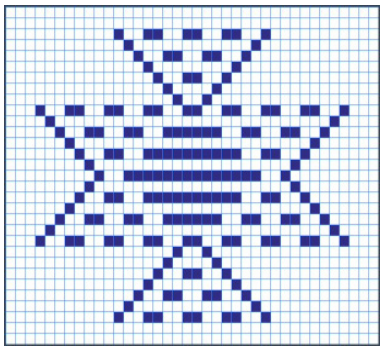
1. Make grid visible.
2. Fill background colour.
3. Add a new layer and select added layer.
4. Select colour and select tool.
5. Start designing with 1 px pencil tool.

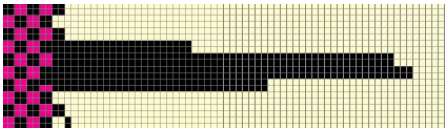
*Note : Use motifs in the given grain only.

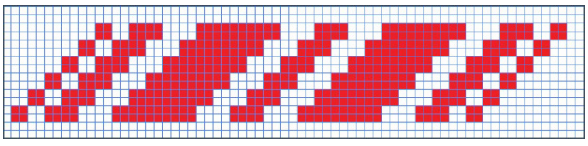


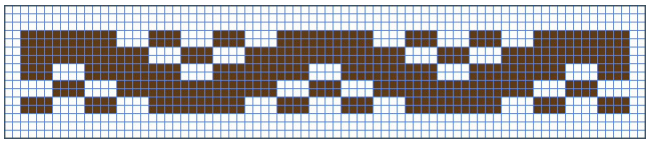








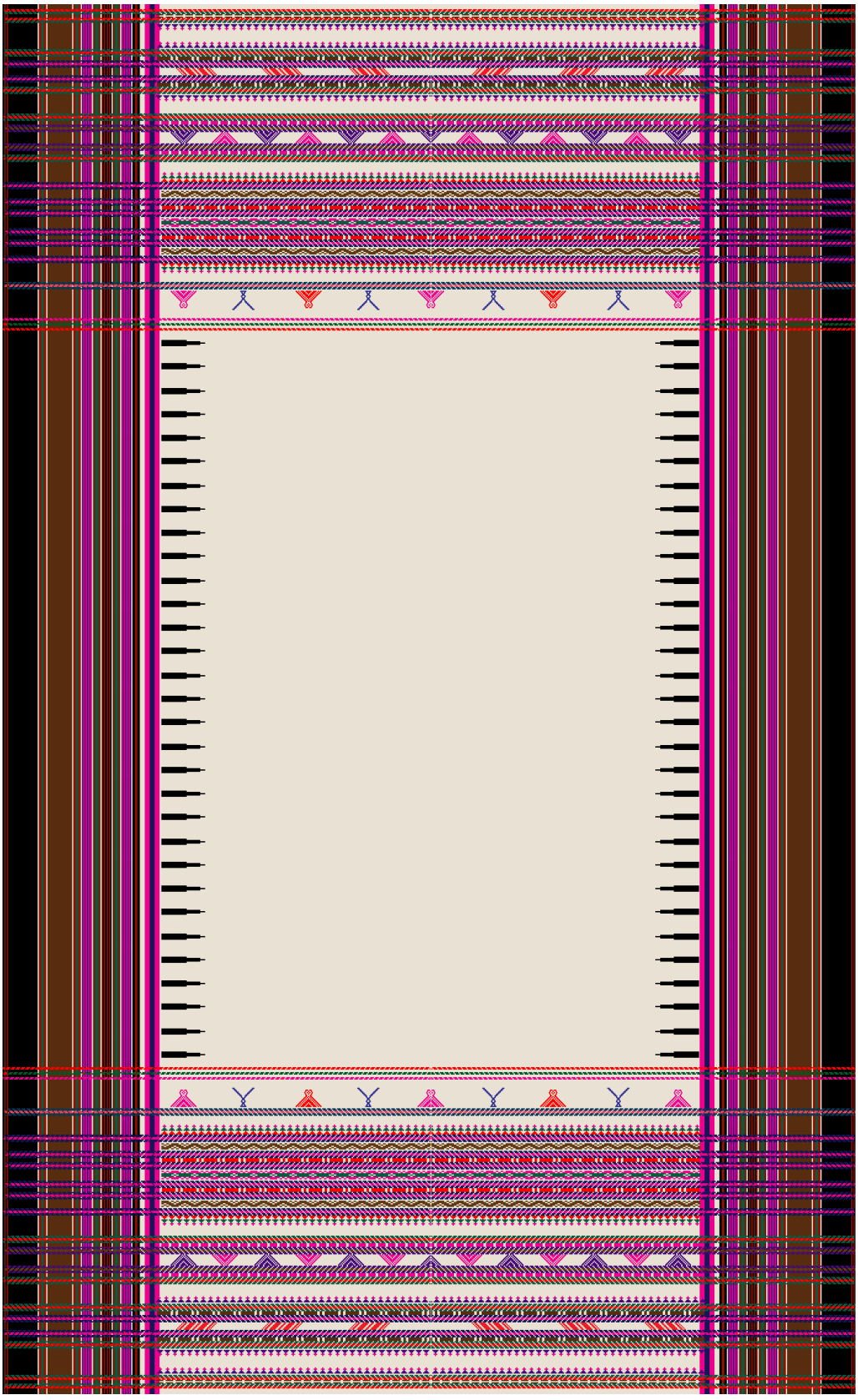


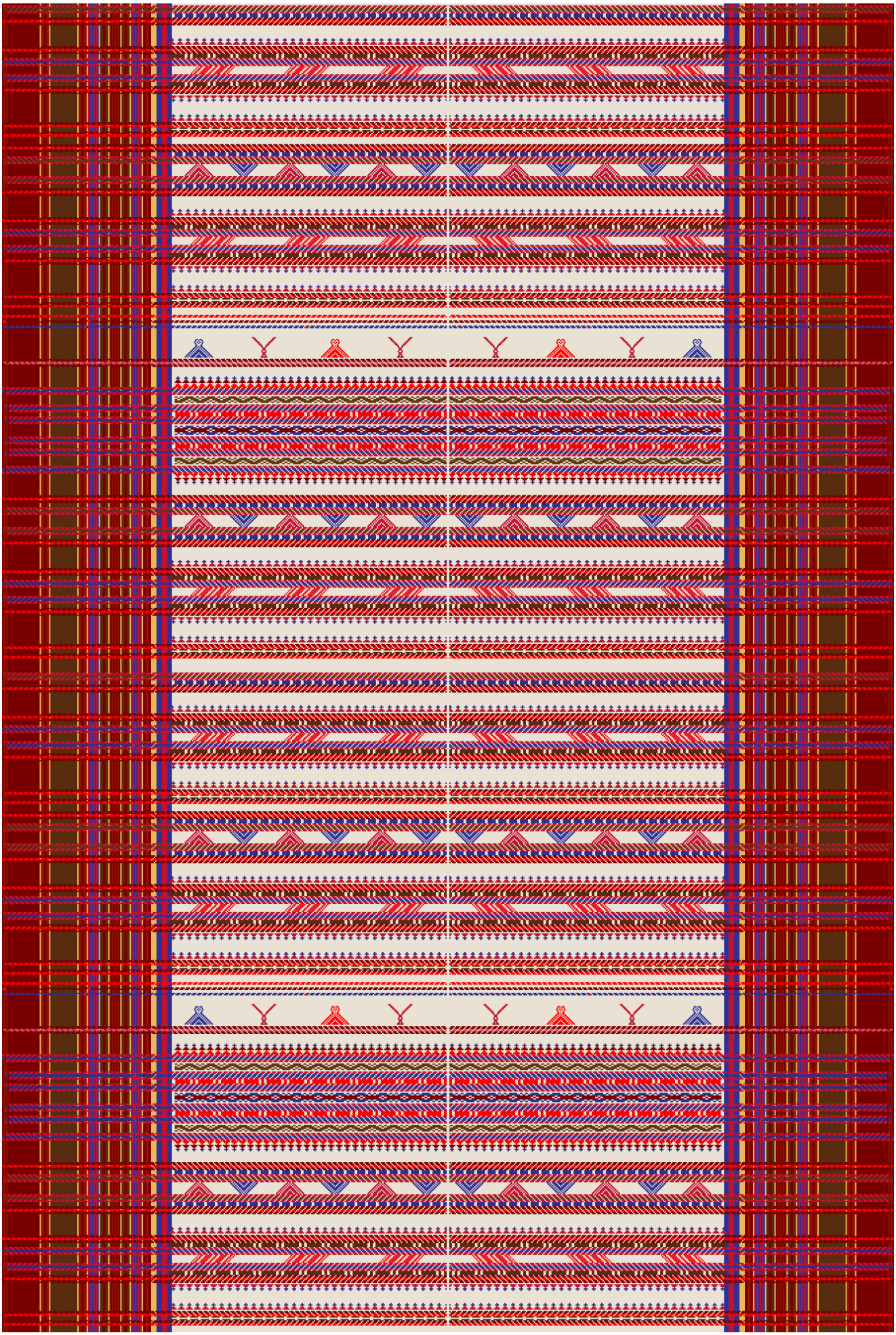


LAYOUT DEVELOPMENT

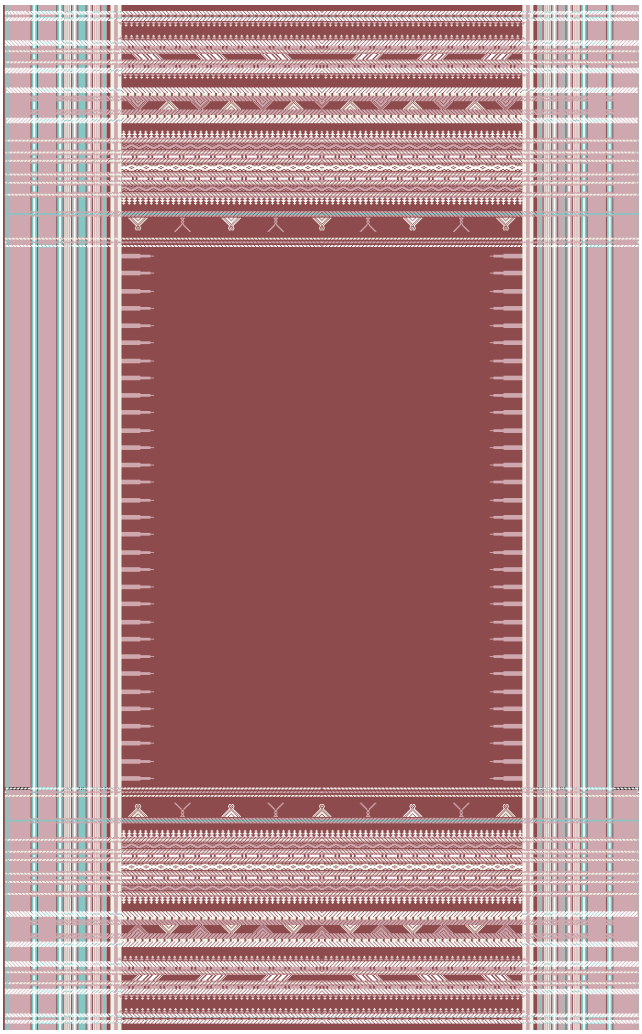
Open a new document
Preset size
Approximately,
Width : 1400 Pixels
Height : 2200 Pixels

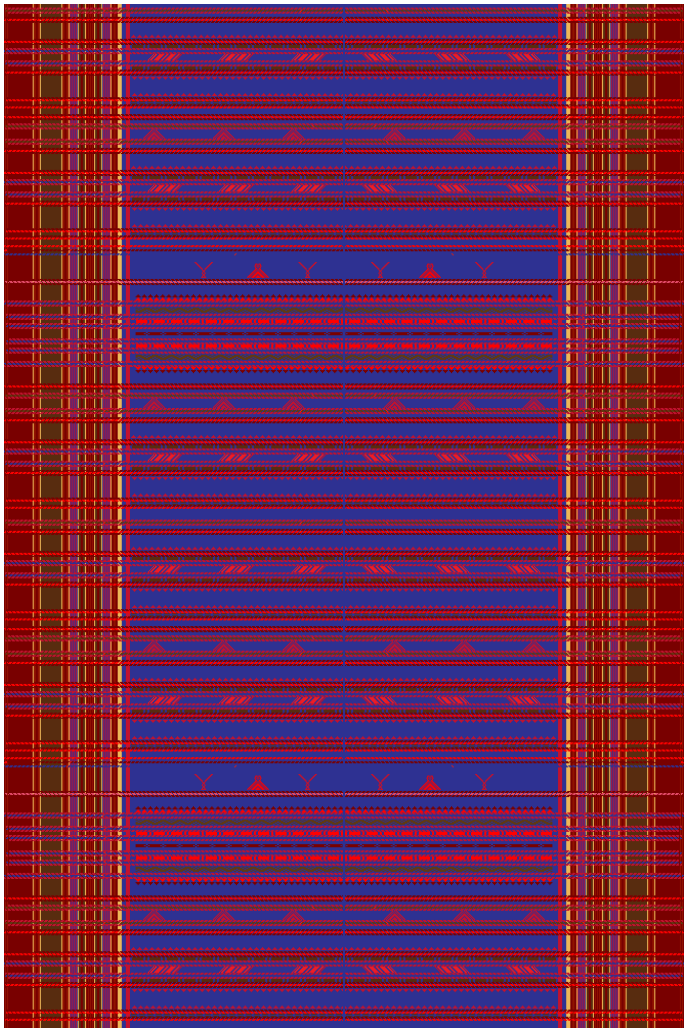
1. Fill background colour
2. Add a new Layer
3. Select colours from the colour palette and draw vertical lines to create warp patterning. Press shift and drag mouse pointer to create exact straight line. Change width from the menu bar, as per the requirement of the design.
4. Drag and drop motifs from the motif gallery/file.
5. Edit > Copy > Paste
6. Design Layout, change colours of background and foreground.

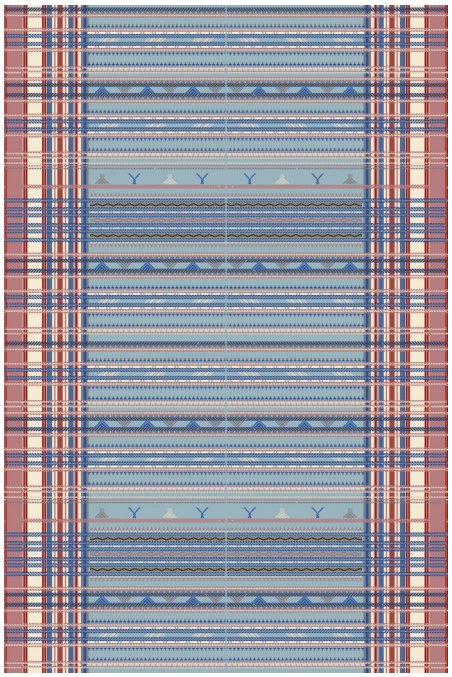


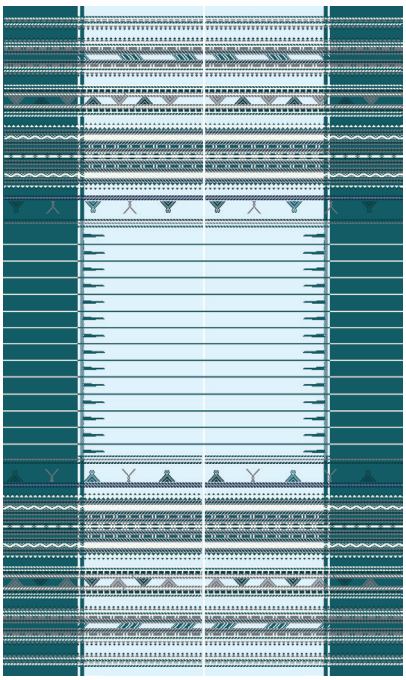


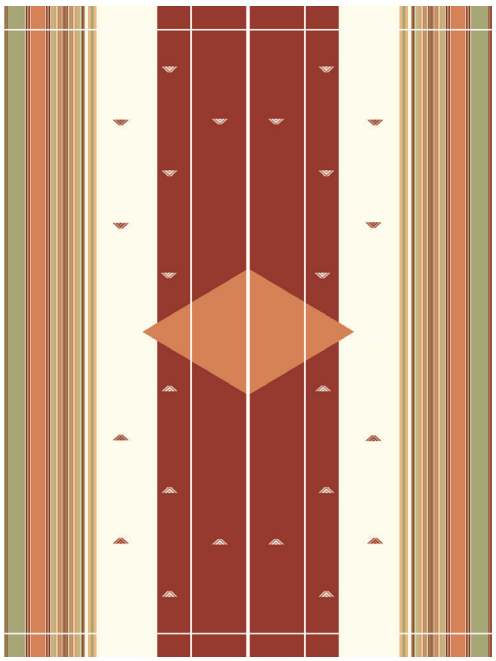
DESIGN AND COLOUR EXPLORATION :











TANGALIYA OF SURENDRANAGAR

About Craft: *Tangaliya* is a 700 years old weaving tradition owned and continued by the Dangasiya community of Surendranagar, Gujarat. It is a woollen cloth, worn by the Bharwad women as lower garment. The motifs are constructed by a unique technique of warp binding technique with cotton thread known as '*dana*'. These *danas* together create the identifying motifs and are a selection from the natural surroundings, daily life and religion of the craftsmen. The motifs range from a single dot to elaborate arrangements of dots, flowers, peacocks, temples, trees. The *Dana* are also arranged in geometric forms, like circles, squares, triangles, etc. Mainly black and maroon in the main body. White and pink are used to create the motifs in the traditionally made *Tangaliya*.

Loom type - The hand operated fly-shuttle pit loom.
• 2 shafts in loom
Material :
Ground - Wool
Motifs/*Dana* - Cotton
Dimension of the Textile
Length - 3 meters
Width - 24'' + 24'' = 48'' total
Weave Structure :
• Ground weave - Plain weave
• Motifs - Extra weft inserted with binding technique called where single dot is identified as *Dana*.

Extra weft design details :
4 sets of warp yarns taken for *dana* making.
Spacing between two *Dana*
Warp - 3 to 5 warp yarns
Weft - 3 to 5 weft yarns
The number of warps taken for making *dana,* and the warp wise and weft wise space between two *Dana* can be differ as per the yarn count, the product or the requirement of the design but it remain constant for entire woven product.

Freedom to explore
• Colours- No limitations for colours for wefts. The warps remains black only.
• Width - Limited to 27 inches for traditional pit loom; 45 inches for upgraded or frame loom.
• Length - Upto 10 meters
• Material - Wool, Cotton, Silk, Acrylic etc.

Ramraj Tangaliya

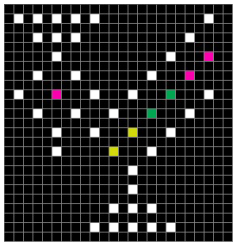
PATTERN DEVELOPMENT IN CAD

MOTIF DEVELOPMENT

Open a new document in Photoshop.
Preset size for Traditional Motifs
Approximately,
Width : 80 Pixels
Height : 130 Pixels
You can adjust the size of canvas the help of crop tool.

1. Make grid visible.
2. Fill background colour.
3. Add a new layer and select a new added layer.
4. Select colour and select tool.
5. Start designing motifs with 1 px pencil tool.

Reference: Page 22



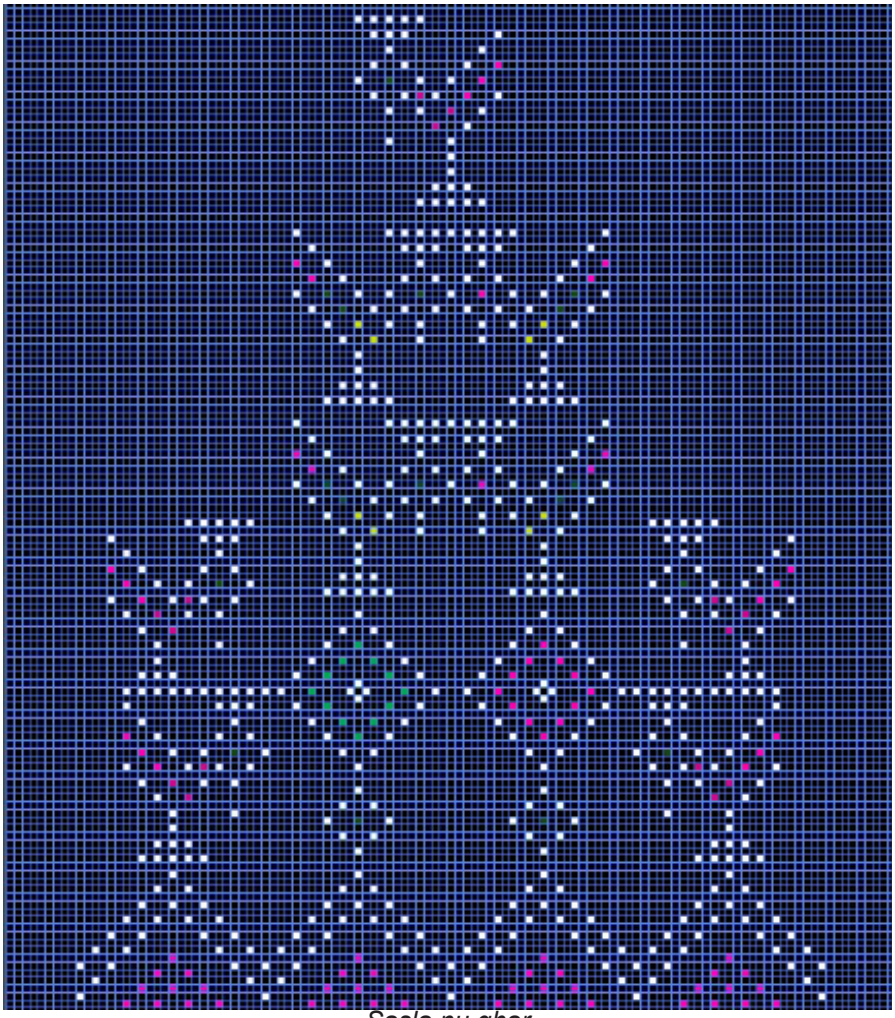
Canvas size
Width : 25 Pixels
Height : 25 Pixels

LAYOUT DEVELOPMENT

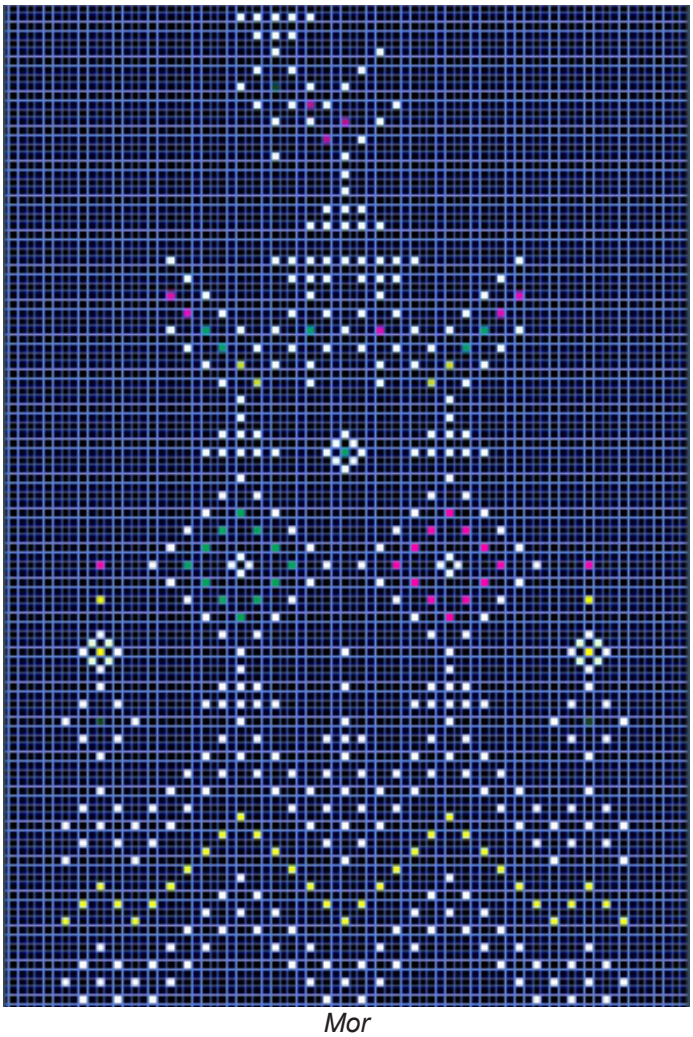
Open a new document
Preset size
Approximately,
Width : 450 Pixels
Height : 750 Pixels

1. Fill background colour
2. Add a new Layer
3. Select colours from the colour palette and draw vertical lines to create warp patterning. Press shift and drag mouse pointer to create exact straight line. Change width from the menu bar, as per the requirement of the design.
4. Drag and drop motifs from the motif gallery/file.
5. Edit > Copy > Paste
6. Design Layout, change colours of background and foreground.

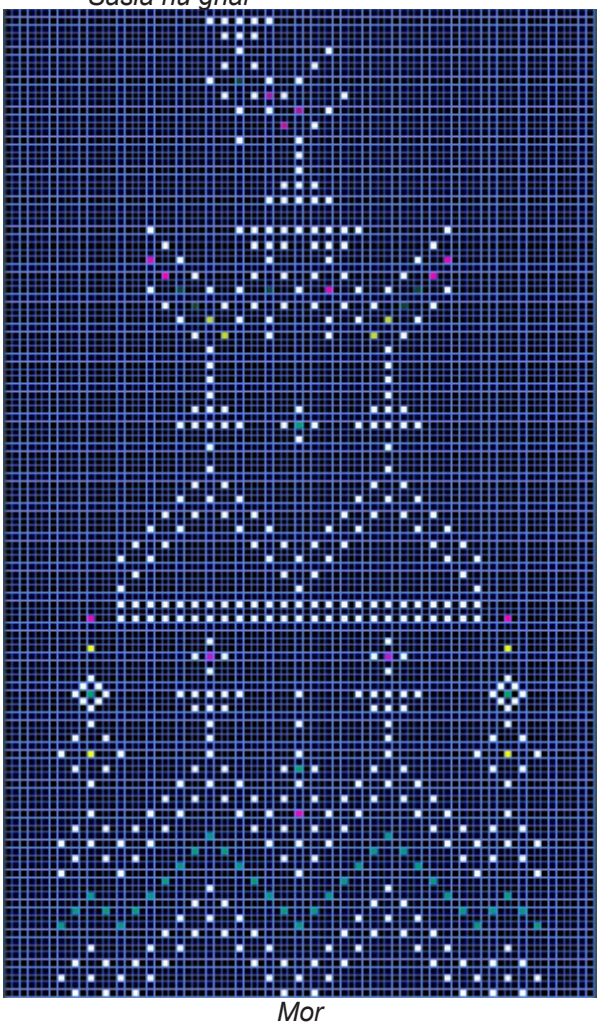
Reference: Page 23



Sasla nu ghar



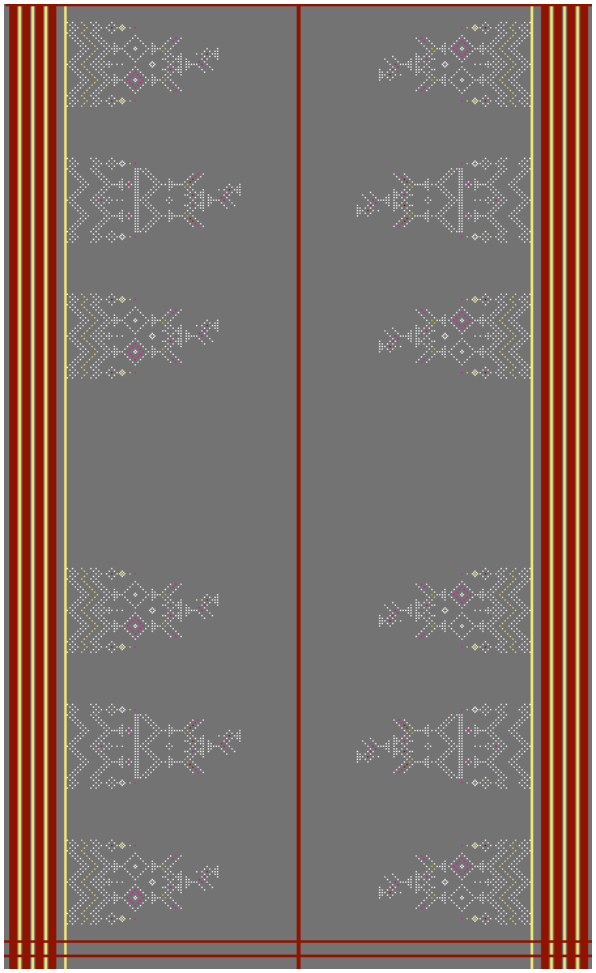
Mor

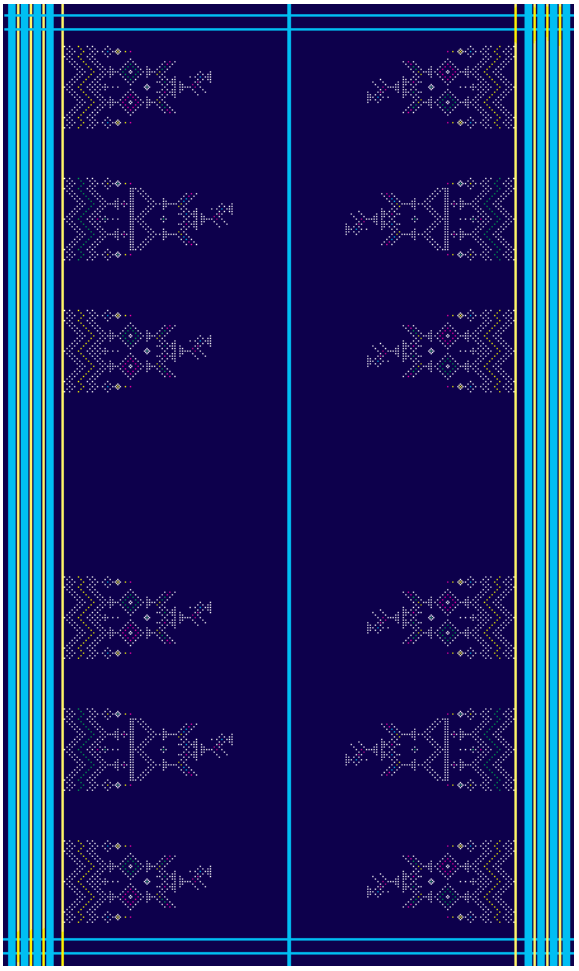


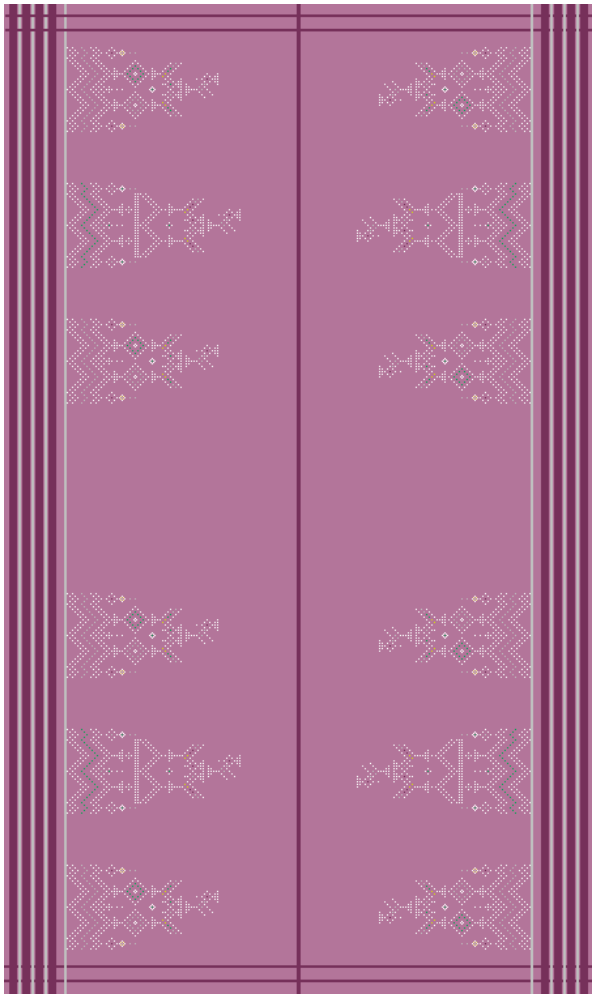
Mor

Ramraj Tangaliya Layout in CAD

COLOUR EXPLORATION :







ASHAVALI SARIS OF AHMEDABAD

About Craft: Ashavali saris are brocade saris with a brocade pallu and border woven in the Ahmedabad region. The tradition is owned and continues by the Patel community. Pareshbhai Patel has learned and continuing the craft heritage of his grand-father Soma bhai Patel and his father Vishnu bhai Patel. Currently he is the only master weaver practicing this craft of Gujarat. The saris are woven with silk and the brocade designs are developed with silk and zari yarns. The motifs are created using the extra weft insertion technique with the help of Jacquard attachment on a Fly-shuttle pit loom. Earlier, Jaala Looms were used to weave the saris. From the last three decaes, they are using Jacquard looms for weaving.

Loom type: The hand operated pit loom with jacquard attachment

• Total 10-12 shafts in the loom.

Weave Structure :

• Extra Weft Brocade Craft

• Plain weave for the base

• Weft twill-Brocade

Material :

• Silk yarns for ground weave

• Silk and Zari yarns for Extra weft / designs.

Dimension of the Sari -

• 45 inches width

• 5-6 meters length

• Border size: 3.5 - 5 inches

• Motif width: 3.5 - 5 inches

Design Details :

• 200 hooks in jacquard – repeat width 3.5 inches

• 480 hooks – repeat measuring 8-9 inches on fabric.

• The cards are punched for the shed formation to insert the extra weft. As per the design.

Border on graph paper developed by the weaver using manual designing tools.

Graph details :

• Graph – Border Design

• Graph Size – A2

• On sari the border size – 3.5 inches wide.

• Each horizontal line of the graph represents the extra weft yarn of pattern.

• The graph is been prepared for punching the card.

PATTERN DEVELOPMENT IN CAD

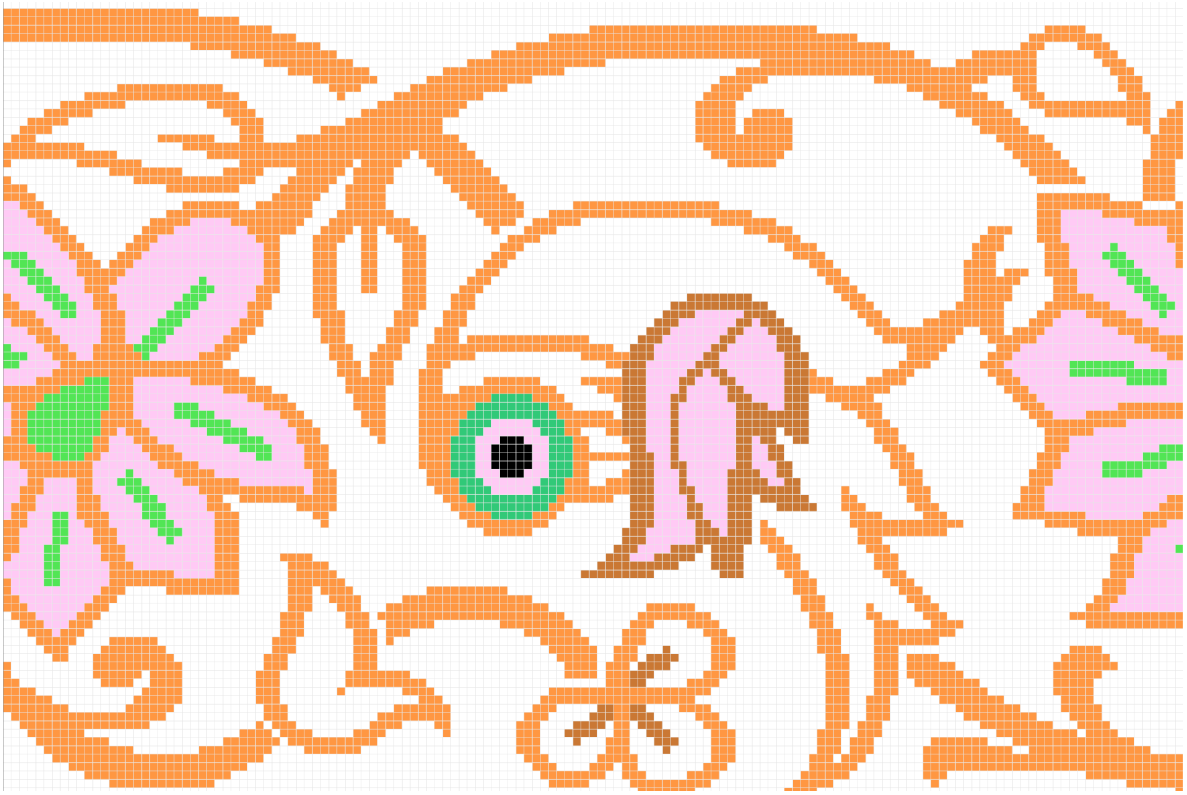
Preset setting for Motif :
Approximately,
Width - 200 Pixels
Height - 200 Pixels

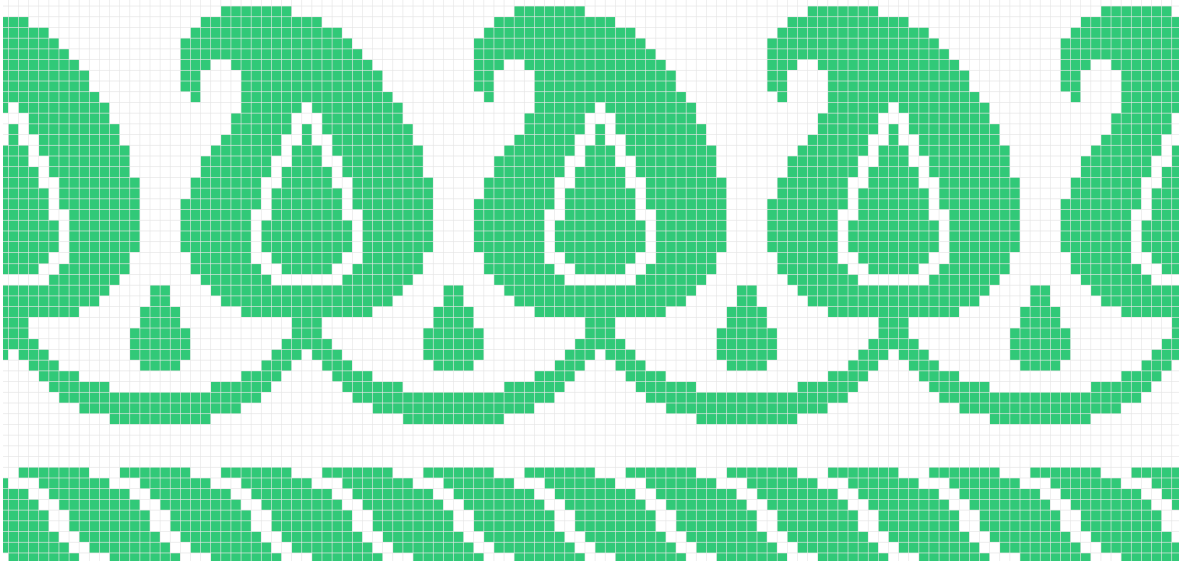
Preset setting for Border :
Width : 200 Pixels, can be extended till 480
Height : 350 Pixels

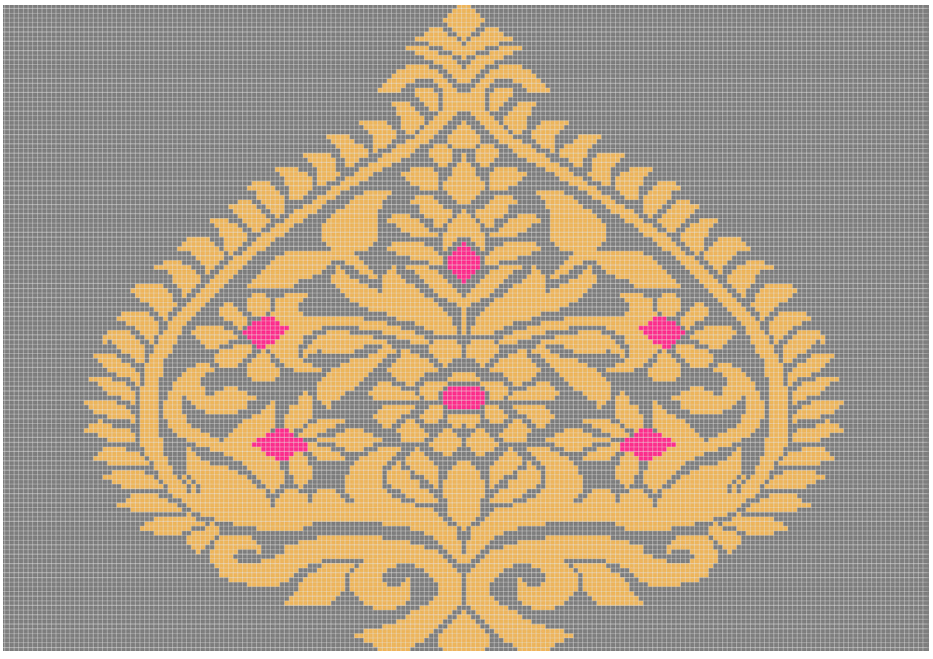
1. Make grid visible.
2. Fill background colour.
3. Add a new layer and select a new added layer.
4. Select colour and select tool.
5. Start designing motifs with 1 px pencil tool.

Note: Refer Page no. 27

Border Graph development in CAD







Pallav Butta

Border

Single motif

Motif offset

For Motif offset

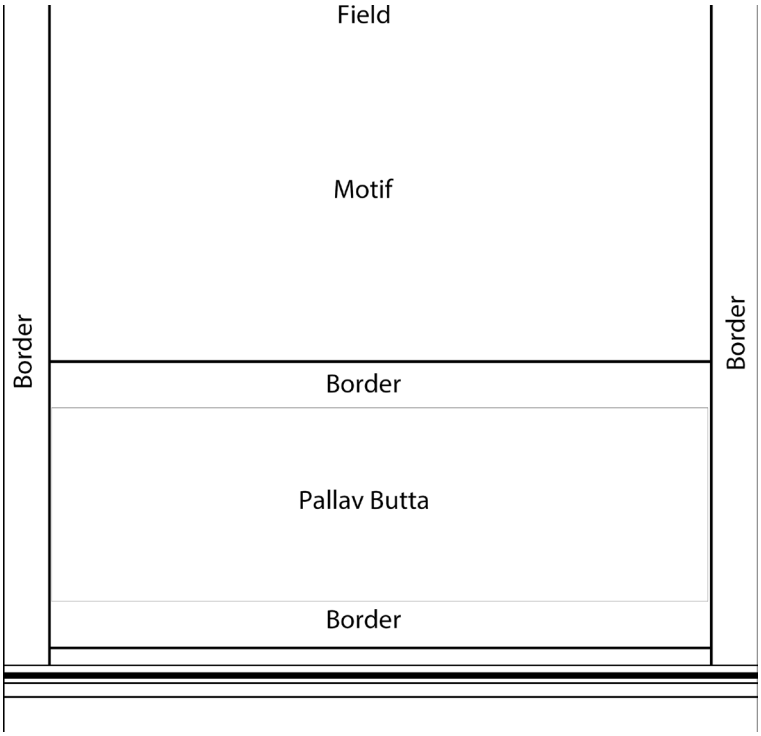
- Select motif layer
- Ctrl + J
- Select duplicate layer
- **Filter > Other > Offset**
- Adjust the horizontal and vertical
- Select wrap around in undefined areas
- Click on **OK**
- **Edit > define pattern**

For Sari Pallav Layout

Preset setting

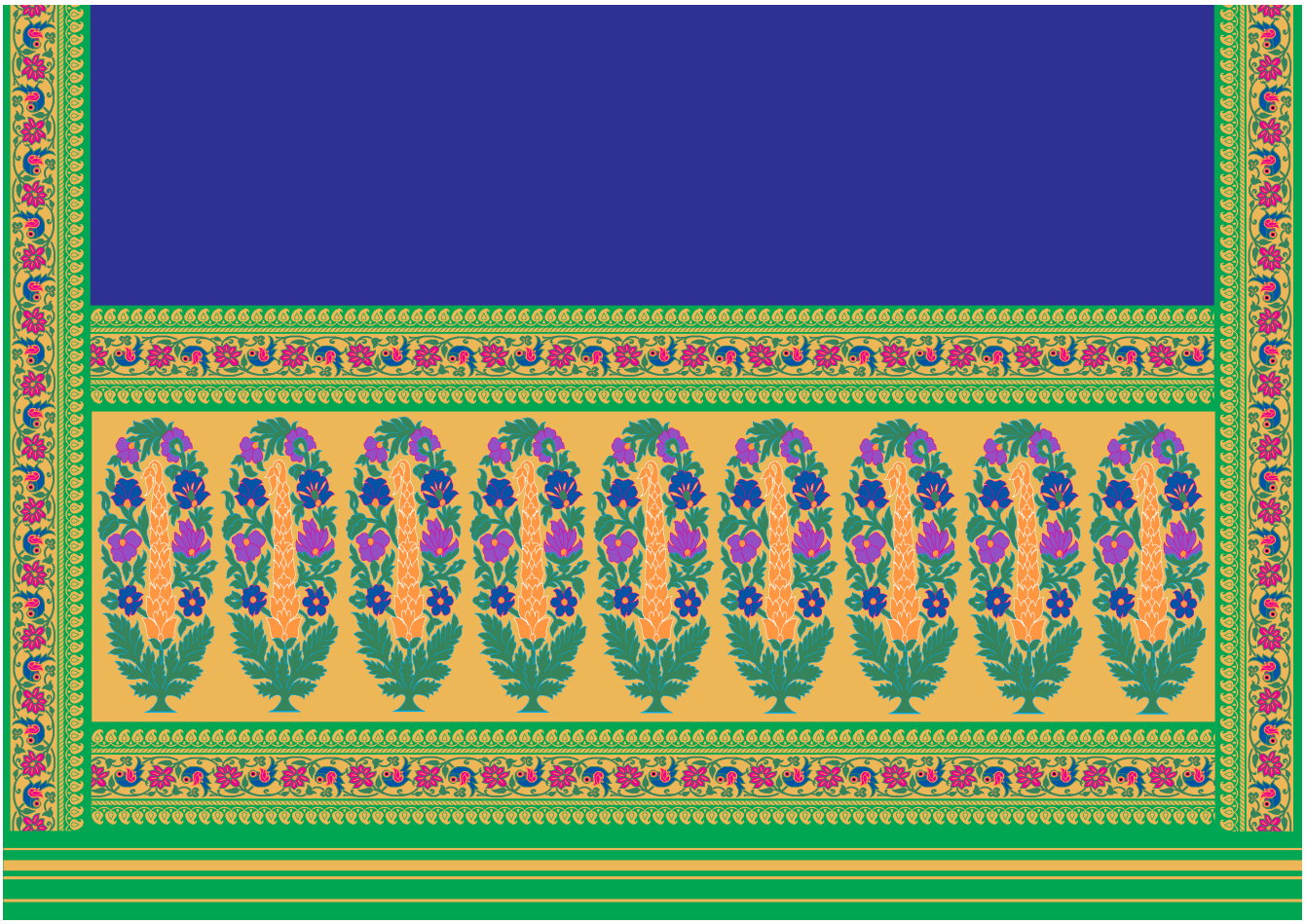
Approximately,

- Width - 3000 Pixels
- Height - 3000 or as per requirement to visualize length.
- Drag and drop motifs from the motif gallery/file.
- Select motif by Rectangular Marquee Tool
- Edit > Copy > Paste
- Create repeat pattern, change colour if requires.
- For Border : Copy and Paste border, adjust edge to edge, place where it requires.
- For field : Draw rectangular shape, and select pattern from the pattern swatch.



Sari *Pallav* Layout

DESIGN AND COLOUR EXPLORATION :



EXERCISES

Exercise : 1

a. Design a Table Mat with Dhabla Motifs. Size - 18 x 12 inches.
b. Design a Floor covering mat using Dhabla Motifs and it’s Layout.

Exercise : 2

c. Design a Cushion Cover using Tangaliya motifs - Size - 16 x 16 inches
d. Develop a stole of size 24 inches in width and 2 meters of length, using Tangaliya motifs.

Exercise : 3

e. Design a fabric using elements from the Ashavali border.
f. Design a stole using mango motif of Ashavali border.

ACKNOWLEDGEMENT :

The authors express their gratitude towards the master weavers;

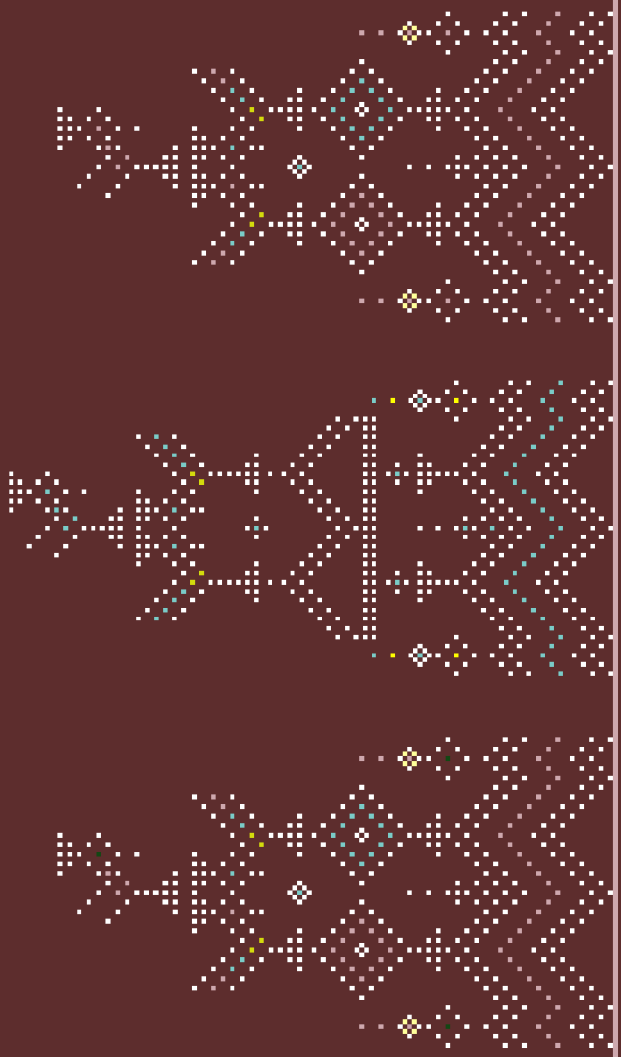
Dhabla and Kachchh Shawl master weavers of Kachchh, Gujarat.

- **Premjibhai Lalubhai Padhiyar, Kanderai village**
- **Babubhai Ladhubhai Padhiyar, Kanderai village**
- **Rameshbhai Kanjibhai Padhiyar (Vankar), Kanderai village**
- **Hamirbhai Vishram Valji Vankar, Bhujodi village**
- **Rajesh bhai Vankar, Chundi village**

Tangaliya master weavers of Dedadara village, Surendranagar, Gujarat.

- **Babubhai Rathod**
- **Mohanbhai Rathod**
- **Baldevbhai Rathod**

Ashavali master weaver, **Pareshbhai Patel**, Ridrol village, Ahmedabad, Gujarat.



THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

सत्यं शिवं सुन्दरम्

Estd. 1949
Accredited Grades "A+" by NAAC

Department of Clothing and Textiles,
Faculty of Family and Community Sciences,
The Maharaja Sayajirao University of Baroda, Vadodara.